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NAVAL WAR COLLEGE  
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There are No Space Wars,  
How do CINCs Fight Using Space Forces?

by

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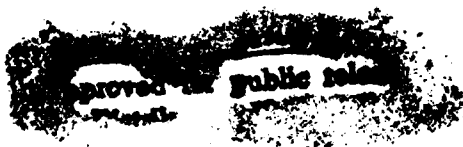
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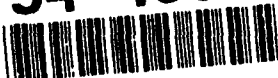
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## Abstract

### There are No Space Wars, How do CINCs Fight Using Space Forces?

Space forces are not yet capable of fighting a war in space, but analysts have concentrated their efforts on developing operational art concepts and doctrine for a war in space. Although this is an important area for evaluation, it does not address the more fundamental issue of how current forces can contribute to the terrestrial battle. This paper examines how the attention focused on fighting a space war has left the CINCs without a clear perception of the space capabilities and proposes a method for understanding and employing these forces. The paper begins by giving background information on operational art and current space forces. It then examines operational analysis which focuses on space wars and shows how this did not provide the commanders with the framework to employ space assets in Desert Storm. The consequences of this failure demonstrate the need for an operational framework to employ current space forces. Finally, a proposal is made on how to apply operational level thinking to integrate current space capabilities in the planning, execution and sustainment of operational level warfare.

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THERE ARE NO SPACE WARS,  
HOW DO CINCs FIGHT USING SPACE FORCES?

I. INTRODUCTION

Military analysts and historians have called Operation Desert Storm the "first space war." And, indeed, on 2 August 1990, when Iraq invaded Kuwait, U.S. military space forces were already on the scene to provide information to United States authorities.<sup>1</sup> However, there were no lasers, phasers, particle beams or anti-satellite weapons used in the space war. No space systems were destroyed, attacked, or even threatened. Despite labeling Desert Storm a "space war", Vice Admiral Dougherty, the Deputy Commander-in-Chief, U.S. Space Command, clarified his use of the term when he said, "...almost every aspect of military operations depended to some degree on space systems support - from commanders of land, sea, and air forces planning their attacks, to drivers of allied supply trains seeking logistics bases."<sup>2</sup> Thus, in terms of warfare, Desert Storm was not a "space war" but it was a war supported from space.

Despite the fact that Desert Storm was not a "space war", proponents of space prepared the CINCs for that war by writing doctrine and discussing operational art in terms of space control and application of force in space, not force enhancement. Real-time information has revolutionized warfare by accelerating the timing and tempo of war. But, the concepts which promote space as "the" battle ground have leapt past current capabilities. As a

military organization, we can not ignore the current capabilities of our space assets as a force enhancer. The CINCs must have a concept of operations which emphasizes existing capabilities to extract the maximum benefit from space. Ingenious adaptation, resourcefulness and ad hoc procedures will not meet the needs of a CINC in future contingencies.<sup>3</sup> My thesis is that the focus on warfare "in space" has left the Unified Commanders and/or Joint Task Force Commanders with an inadequate framework for employing current space assets. Thus, space is not fully integrated into the operational level of war. However, with the concepts of operational art applied to current space capabilities, commanders can gain an understanding of how to employ space forces, and enhance operational level planning, execution and sustainment.

To prove this thesis, I will begin by defining operational art and briefly cover the capabilities of our current space forces. This approach is intended to provide a common point of departure on both subjects so that later references to operational art and capabilities of satellite systems will have relevant meaning. In the next chapter, I will use examples of recent studies to demonstrate that contemporary applications of operational art and doctrine are ignoring our current space capabilities. I will show that they address how to fight a war in space not how space should be used to support current combat capabilities. As a result, an examination of Desert Storm in chapter IV will reveal that space forces were not fully integrated into the operational campaign plan. I will show that this lack of integration resulted in an

inefficient use of resources.

In the final section, I will present my proposal on how to fight near term wars supported from space. First, I will explain why it is important to skillfully employ current space capabilities. I will then present a table which shows how each space segment; weather, warning, reconnaissance, navigation, and communications, can be viewed in operational terms by applying the concepts of operational art. Finally, with the table providing a framework to understand space capabilities, I will suggest how the CINCs can integrate these concepts into the campaign plan to take maximum advantage of space resources.

## II. BACKGROUND

To insure a common starting point for this discussion, I will define the concepts of operational art and illustrate how operational level thinking is used by the CINCs. I will then review the space resources which are available to the CINC for integration into campaign plans. It is important to understand operational art and space resources in order to discuss the employment of space forces to support the operational level of war. In future conflicts, space systems will be the key to providing rapid and accurate understanding of the threats and opportunities facing the war planners.<sup>4</sup> A better understanding of the resources available will allow a CINC and his staff to improve their use of space in future crises.

Definitions of operational art, or the operational level of war, are spread throughout military literature. A formal definition which is shared by the Strategic Studies Group at the U.S. Army War College, the Air Force Manual on Aerospace Doctrine, and all Joint Publications defines operational art as;

"The employment of military forces to attain strategic goals in a theater of war or theater of operations through the design, organization, and conduct of campaigns and major operations."<sup>5</sup>

The U.S. Marine Corps publication FMFM 1 states that the operational level of war includes deciding when, where and under what conditions to engage the enemy in battle and when to refuse. It goes on to say that the operational level of war is the art of winning campaigns and includes a broader dimension of time and space than tactics.<sup>6</sup> A another simple definition suggests that the operational level of war is a sequence of actions to produce military conditions for strategic goals.<sup>7</sup> From these various definitions, it is apparent that the concepts of operational art provide the framework for the overall scheme of activities to conduct a major operation. Without operational level thinking there is no framework or plan which ties the strategic goals to tactical combat.<sup>8</sup>

The leadership on an operational level is the Combatant Commanders or Unified CINCs. These leaders must continually think and plan at the operational level to develop a broad view of the entire campaign and tie the tactical battles to the strategic objective or goal. They cannot limit their scope to one major battle or, the air campaign, but, they must determine how the air



campaign and a series of battles will contribute to the overall military objective. This means the commanders are not just concerned with superior force, air superiority, and controlling the sea lines of communication for the sake of fulfilling a military doctrine but that these military tenants must contribute directly to the military objective.

Commanders want to divine the enemies intentions and control enemy actions. They want to determine how to achieve the strategic or political goal by determining the military objective which will strike the opponents center of gravity (COG) or hub of power. The commanders must define the decisive points which, if attacked and defeated, will expose the COG whether by destruction, manipulation, overextension, or isolation. To accomplish this, the commanders must develop a sequence of actions for the campaign using the concepts of deception, maneuver, synchronization, operational logistics and other operational art concepts which allow them to effectively attack the decisive points. The concepts described above are the heart of operational art for the commander. He must correctly apportion his forces to implement his operational concept and thus achieve his military and political objectives.

In terms of space assets, correctly allocating forces means planning and employing space assets so that they contribute to the commander's overall intent.<sup>9</sup> Commanders are responsible for the mobilization and deployment of forces into the affected theater of conflict. In the past this meant air, land, and sea forces. Today this also includes the space assets. These forces do not represent

the pointed end of the spear, but, like military transportation, are an important part of the shaft which propels the spear.

United States space forces currently provide four distinct capabilities; communications, navigation, weather, and warning and reconnaissance. These forces are distributed around the globe and have the potential to be a tool in any theater of conflict. The fact that these "information systems" are space based allows them to operate legally over any sovereign state without escalating the conflict or alerting an adversary. This capability gives the commander a great deal of flexibility in responding to a crisis, particularly in the early, or planning stages of a conflict.

The communications portion of the space segment provides the capability for worldwide voice and data transmissions in both the clear and secure mode. The communications system is composed of satellites that are primarily in a geosynchronous orbit around the earth. These satellites appear to remain stationary over one point and by positioning three satellites 120 degrees of longitude apart they can provide near world wide communications. The Army, Navy, Air Force and NATO operate separate systems which can be linked together if required. In addition, satellites can be leased through commercial sources. These systems can also be used for intra-theater communications between a commander and his tactical forces.

However, each of the systems has a finite number of communication channels available which must be allocated and managed during information intensive crisis periods. Additionally,

the receivers/transmitters for accessing the communications channels vary in type, size, and weight depending on the amount and sophistication of data required to be handled by the user.

The navigation portion of the space forces is primarily handled by the Global Positioning System (GPS) satellite operated by the Air Force. The GPS system consists of 24 satellites operating in orbits 11,000 miles from earth. These satellites provide worldwide, 24 hour a day, all-weather navigation and timing information in three dimensions to an accuracy of 10 meters. The satellites operate in a passive mode. This means that they continually transmit a downlink signal much like a radio or television station. The satellite is not designed to require a signal from the receiver to transmit navigation information, therefore the number of potential customers on the system is unlimited just like a television or radio broadcast. Like the communication package, the navigation package requires a soldier, sailor or airman to possess a ground receiver to access the navigation information. Thus, the availability of accurate navigation and timing data for air, ground, and sea forces is only limited by the number of receivers which the military can supply its forces.

The space assets which report weather and environmental data are operated by the Air Force, the Department of Commerce, NASA, and the civilian sector. These satellites operate in a variety of orbits and all except the NASA system feed their data directly into the Air Force and Navy weather centers. The two Air Force weather

satellites provide complete coverage of the earth once every 4 to 8 hours. The visual and infrared (IR) data from these satellites can be transmitted directly to any associated terminal within view of the satellite to provide information on cloud cover, temperature profiles, water vapor, and precipitation in the local area. The information is also stored and dumped into military weather centers in the United States. Because the above systems do not meet all military needs, a civilian satellite system, with two satellites over the America's and Africa, provides the military with weather information once every thirty minutes. Additionally, the Commerce Department's two satellites provide data to the military weather center. Finally, the NASA system, which is not linked to the military weather centers can provide data on terrain types and surface conditions.<sup>10</sup> Since only the Air Force satellites are able to give theater commanders with DMSP receivers realtime data at limited intervals, this force multiplier requires considerable management and planning to gain effectiveness in operational planning and execution.

Finally, the warning and reconnaissance satellites operate in a highly classified environment. It is not important to know detailed capabilities for the purpose of this paper but at the unclassified level some general capabilities can be discussed.

The Defense Support Program (DSP) is part of the attack warning system at NORAD and can detect rocket launches around the world. Other satellites can provide detailed visual, radar, and infrared data to national command centers. The radar and IR allow

these systems to provide data at night as well as daylight hours and to "see" objects not detectable with visual photographs. However, cloud cover can prevent effective use of these systems. None of these "spy" satellites are designed to provide data directly to the commander in the field. Nevertheless, with satellite communications links, imagery can be transmitted almost realtime to the field if the commanders have personnel who can interpret these images. These capabilities are vital for a variety of functions including detection of equipment and troop movements, selecting targets, and assessing battle damage.

The above paragraphs highlight the range of the space systems available to develop and implement a plan on the operational level by the theater commander. There are no satellite lasers or anti-satellite system in the inventory. With current space capabilities in mind, I will now examine how operational thinking has been applied to space forces and how this thinking effected the use of space assets in Desert Storm.

### III. Contemporary Strategies for Space

For the past decade, most space warfare strategies and operational level documents have addressed space control or how to plan and conduct war in space. This analysis is valuable in shaping the future of our space systems and capabilities. However, the failure of these studies to address force enhancement leaves a gap in operational level thinking related to employing current

space forces. As a result the CINC does not have a framework for building operational employment strategies for present space systems.

Research for information on operational level employment strategies of space forces reveals an extensive amount of information, by a number of individuals and institutions. These studies discuss warfare in space but provide little information on warfare supported from space.

One example is a Colbert Prize winning paper in 1990 from the Naval War College on "U.S. Military Space Strategy."<sup>11</sup> This paper addresses military space doctrine strategy and asks if the United States needs anti-satellite capability to be effective. To demonstrate the thesis, the author outlines a potential military strategy for space which addresses how to fight a war in space. At one point the author quotes U.S. Space Command Pamphlet 2-1 on Doctrine on Space Control Forces. This official pamphlet from a USSPACECOM study applies the principles of war to war in space. In general terms, Pamphlet 2-1 discusses concentrating anti-satellite combat power, providing satellites with maneuverability, and concealment of space forces.<sup>12</sup> Pamphlet 2-1 would certainly lead a CINC to believe that U.S. Space Command envisions its mission as winning the war in space, not using space assets to support terrestrial forces. After all this discussion, the author states, "The proposed space strategy is a planning strategy vice a strategy based upon current capability and force structure...the force structure to implement this strategy does not yet exist." <sup>13</sup>

A later writing on the progress of Air Force effort to develop operational doctrine for space points out that AFM 1-1, the Air Force's basic aerospace document only incorporates space to a limited extent and that as of 1991 the Air Force was operating with no approved doctrine for space. The draft of the proposed doctrine promotes the concept of "integrated aerospace power."<sup>14</sup> This view of space treats space forces in the same manner as air forces. Thus, the primary role of space assets is to fight and gain control of space so that space weapons can attack centers of gravity, seize the initiative and execute concentrated attacks. But, again the writer states that these tasks are not within the current space force capabilities. The proposed doctrine does cover force enhancement, support of air, land, and ground forces, as a secondary role of space assets, but the offensive flavor of the new Air Force space doctrine is emphasized.<sup>15</sup> This official government document would provide very little assistance to the CINC in developing an operations plan which incorporates current space capabilities.

Further examples of studies which ignore present space capabilities include a 1989 book commissioned by congress on military space forces which discusses operational art in space. The book covers the need to consider space superiority as a rule of space, and the need for surprise, deception, and attack options for anti-satellite weapons.<sup>16</sup> There is no mention of current space force support capabilities.

Yet another seventy page research paper from Air University

focuses on space systems warfare and the strategies for conducting a war in space. The author states that military strategists must prepare for war in space because it is the next war zone.<sup>17</sup>

An army officer weighs in with his opinion that the U.S. must develop a national strategy on how to fight a war in space by hardening satellites, developing an A-SAT, and developing more maneuverable satellites.<sup>18</sup>

Finally, a 1988 operations research paper by a naval officer asserts that warships in space, photon torpedoes, and space commanders like Captain Kirk are not far off. He asserts that we need a forward looking space strategy to project military power into space with maritime operations as the model for space.<sup>19</sup>

Only one document in my research, a 1991 Naval War College operations research paper, addressed the importance of employing space assets along with air, land and sea to accomplish strategic objectives. The author proposed a method for integrating these requirements by matching the satellite system (i.e. navigation or weather) with the agency that operated the system. The CINC staff planner could then contact the responsible agency to determine capabilities and availability of the system.<sup>20</sup> I agree that force enhancement is important but, I will present a different thought process on integrating these assets.

I would submit that all these studies on warfare in space are important and valid. However, they focus on future capabilities just as proponents of the airplane did in the early 1900's. In that period, there were visionaries who saw great military



potential in the airplane. However, until technology caught up to the vision in World War II, and some would say until the Gulf War, the airplane was misused and under-utilized. Its full capability to support the ground and naval forces was never realized as airmen sought to set themselves apart from surface forces and revolutionize warfare in this new "fighting" frontier. This same mentality appears to be present in the visionaries for space. Although space warfare may one day prove to be the ultimate high battle ground, today, military leaders need a framework for using current space capabilities. The lessons learned from the use of space assets in Desert Storm will bear out this assertion.

#### IV. Space Lesson of Desert Storm

Most reports correctly hailed Desert Storm as a successful coming out party for space because of the significant role played in the terrestrial conflict. However, a closer look reveals that there were serious problems of poor planning. The poor planning and a lack of understanding by the CINC resulted in inefficient use of space resources. This lack of understanding was highlighted in a white paper from Air Force Space Command on space strategy when the authors stated that, "Just as World War I gave the first glimmers of how air power could be used in military operations, Desert Storm only previewed the significant role that space will play in future military operations."<sup>21</sup> Despite the fact space assets have been available for military operations since the 1970's

the use of space was not well integrated into the operational planning process just like the airplane in World War I.

Many proponents of space point to Desert Storm as an "...eye opener for the combat arms..."<sup>22</sup>, "...a watershed event in military space applications,"<sup>23</sup> and the emergence of space as "...an integral part of the force structure..."<sup>24</sup>. Indeed, it was all these, with space communications assets providing more than 90% of all inter-theater communications plus significant intra-theater communications. GPS data guided pilots in smoke and heavy clouds, helped clear and mark mine fields, guide munitions, and orchestrate every aspect of deployment and maneuver. DSP attack warning satellites alerted U.S. and Coalition forces of Scud missile attacks, while imaging satellites monitored enemy movements, provided battle damage assessment, and identified amphibious and airborne landing zones. Finally, weather satellites contributed updates to changing weather, alerted forces to sandstorms, and were used to plan attack missions.<sup>25</sup>

But, behind the successes were a series of problems which point out the commander's failure in integrating space into the operational plan. This problem was described by Alex Roland when he characterized technology as entering the military invisibly. He went on to say that technology appears with no advocates and even the participants don't seem to promote or understand it. Doctrine lags behind the capabilities and commanders don't understand the consequences on military operations.<sup>26</sup> This certainly describes the evolution of space capabilities in Desert Storm.

For GPS navigation, the system was not fully operational at the time of the Kuwait invasion. Only two or three hundred GPS receivers were sent with the initial forces to the Gulf. GPS was not seen as a major factor in conducting the war and thus was not integrated into the operational planning. It soon became apparent that navigation information was an important item in the featureless environment. By the end of the war more than 4,400 receivers were in the area. Most of these were commercial units. Some were even sent from the United States by relatives of service members.<sup>27</sup> The lack of GPS receivers and the use of commercial units sent by relatives certainly indicates a failure to incorporate space navigation into the campaign plan.

The space based communications system required two satellites to be moved over the theater after the invasion.<sup>28</sup> "...Thousands of ground terminals had to be transported into the theater because they were not deployed with the operational field units."<sup>29</sup> It took months to weave a communications net together because there was no comprehensive operations plan for the CINC. Still there was not enough capacity and the final report to Congress on the Gulf War stated that one shortfall was a lack of communications redundancy.<sup>30</sup>

Despite the fact that Scuds were a known threat going into the conflict there was no plan which included space forces to battle this threat. Ultimately, the DSP satellite was able to provide warning of Scud missile attacks. An ad hoc communications network was put in place to feed the DSP warning data to the theater

without an operations plan even in the concept stage. As a result it took months to refine the process and procedures.<sup>31</sup> It was fortunate that the enemy allowed the Coalition forces five months to discover and refine this capability.

Finally, weather satellites were also not part of the total plan and not ready to support the needs of the CINC. To make up for this shortfall a third DMSP was placed in orbit in December of 1990. This previously planned launch was a fortuitous event and did not represent an ability to surge in space. Even with a third satellite, military space systems were unable to meet all the rapidly changing operational requirements. Additionally, there were no small tactical terminals available so that mobile army units, could use the weather data available. Some Navy ships had meteorological personnel on board, but did not have DMSP terminals for predicting weather patterns.<sup>32</sup> Proper integration of space could have prevented unrealistic expectations of the DMSP system and allowed campaign planners to develop a workable solution.

Thus it is apparent from the examples above that the potential of space systems to contribute to the terrestrial war effort was not widely apparent nor integrated into the operational plans. In his assessment, the Commander of Air Force Space Command, General Moorman said, "Operational planning for the use of space systems was not well developed when Iraq invaded Kuwait. We are still relatively unsophisticated about integrating space into our routine operational planning."<sup>33</sup> The final report to Congress on the conduct of the Gulf war found, "The use of space-based support by

operational and tactical commanders needs to be improved, institutionalized into military doctrine and training and routinely incorporated into operational plans."<sup>34</sup>

It is clear from the post war analysis that the successful use of space in the war was due in large part to innovation, creativity, and ad hoc procedures, not development of operational level thinking to employ space assets. The focus of space thinkers in the late 1980s and early 1990s on doctrine and operational art to fight space wars left the perception that space could only contribute by winning the war in space much like the navy at sea in the early part of this century. It did not provide the CINCs with an understanding of the impact space could have on terrestrial forces or provide a sound plan for integrating space to support the air, land and sea forces. The results of Desert Storm highlight the need for an operational framework for employing current space assets. The CINCs must understand how space forces can effect terrestrial warfare and be prepared to extract the maximum possible from space in future conflicts.

#### V. Applying the Concepts of Operational Art to Space

Space assets are another resource which the CINCs must integrate into the operational planning process. The space information will not just appear anywhere in the world without prior coordination and planning. Each segment of the space force can function to support the overall operational concept and thus

multiply the capabilities of air, ground and sea forces. The CINC can use these operational concepts as a framework for integrating current space forces into the operations plan.

The requirement for space to support the terrestrial forces is indicated by Joint Pub 3-14, The Doctrine for Space Operations (Draft). This Pub directs the CINCs to "Integrate and exploit the unique operational capabilities which space systems provide into their force structures..."<sup>35</sup> Space systems provide the commander the opportunity to determine the military conditions required for victory by; identifying enemy orders of battle, determining the status of enemy forces, understanding the physical environment, perceiving evolving threats and opportunities, and precisely synchronizing his attack. These advantages will allow him to shape the battlefield and execute his operational plan.

However, space systems are like military transport in that they are a national resource and not the resource of one CINC. As such, commanders cannot expect to control all the assets of space, even in conflict. Because the United States does not have a surge capability to launch space assets, space forces will be a "come as you are" element of the total force. This lack of surge will limit the commander but it will also simplify planning because all capabilities are relatively fixed.

A commander must know and understand the limitations of space systems in order to properly use space resources. Despite the fact that some space assets function in the passive mode and have no limits on the number of forces they can support at one time, all

systems are constrained by some aspect of the total space package. GPS navigation, for example, has the potential to send data to an infinite number of users, but only those forces equipped with GPS receivers can benefit from this space capability.

As evidenced in Desert Storm, the CINC must have a plan which identifies the satellites required and insures the associated ground equipment is provided to the forces which require support.

To understand how to view space forces with an operational "eye" there should be a framework which identifies the potential of individual space systems to support operational art concepts. This framework or table would be part of the Space Annex for an operations plan. The CINC should analyze how he envisions space forces supporting a variety of operational art concepts which are incorporated into his operations or campaign plans. When the CINC develops a military objective or sequence or actions for a standing campaign plan, the table I have developed will provide a concept of how each space asset could support different operational theories such as decisive points, maneuver, lines of communication, operations tempo, etc. When the time came to perform crisis response planning, the CINC would use the same table in his Space Annex as a guide for how space resources should be incorporated into his crisis operational plan. The annex would also be useful to identify the forces which require space ground assets prior to conflict. Table 1 is offered as an example of how a CINC should frame his space capabilities.

Table 1

SPACE SYSTEM	COMM	NAV/ TIMING	RECON/ WARNING	WEATHER
FREQUENCY OF DATA	24HRS	24HRS	2-6HRS	4-6HRS
PRIME LIMITATION	CHANNEL CAPACITY	RECEIVER AVAIL	NATIONAL PRIORITY	SATELLITE COVERAGE
OPERATIONS CONCEPT				
ID Center of Gravity	x		x	
Determine Military obj.	x		x	
Attack COG	x	x	x	x
ID decisive points			x	x
Attack decisive pts	x	x	x	x
Ops Maneuver	x	x	x	x
Control tempo	x	x	x	x
Synchronize forces	x	x		x
Deception	x	x		x
Economy of Force	x	x	x	
Mass/dispersion	x	x		x
Est lines of Ops	x	x	x	
Maintain lines of Comm	x	x	x	
Execute Ops reserve	x	x		
Direct Ops fires	x	x	x	x
Est Ops logistics	x	x	x	
Conduct Ops protection	x	x		



In the detailed portion of the operations plan, Annex N, operational thought could be developed to address the application of space forces to specific operations concepts. The following is offered as an example:

OPERATIONS CONCEPT: Attack decisive points.

Communications: Communications systems can allow for continuous contact between the tactical units and operational command centers. With this capability we can effectively attack decisive points by directing forces to decisive targets as they emerge or shift.

Navigation: Navigation and timing can allow for application of force at a specific location and at a specific time. This will insure friendly forces are properly located and spaced to maximizing strength and synchronization on a decisive point.

Warning/Recon: Reconnaissance will allow commanders to identify decisive points based on terrain, structural locations, military formations and enemy communications traffic. This information can be use to determine the decisive points in a theater.

Weather: Weather information will allow commanders to determine favorable weather conditions for striking decisive points. This will effect the timing of coordinated operations and insure the commander can maintain an operations tempo which is to the advantage of the friendly forces.

I would not suggest that the table and list above includes every operations concept or detail a commander may want to consider. Nor could the Space Annex of an operations plan cover every possibility for using space. However, these types of tables should be developed to stimulate space related operational thought and generate a better understanding of where space forces can enhance operational planning, execution, and sustainment. Space assets must be integrated into these three phases of a campaign.

Space forces will have a role in the planning process since

intelligence and weather information are crucial factors in determining the military strategy and developing the operations plan. Space forces will have a role in the execution phase since communications link the operational commander with the tactical level and allow for monitoring and modification of the campaign planner's sequence of actions. Navigation allows for precision movement by troops, ships, planes and their weapons. And finally, space forces will have a role in the sustainment phase. The communications and navigation information allows the logistical and rear support to coordinate all actions with the combat forces and put supplies in the right place at the right time for effective use.

As the specific plans and operational concepts are developed, the CINCs should elaborate on the use of space assets to support the event. The Commander must identify the number and type of space and ground systems required to support his operations plan and force structure. Doing so will help determine whether he has the proper space and ground assets to implement the campaign plan. The CINC must understand the specific capabilities and limitations (such as higher priorities) of the space system to support his operations plan. The commander must ascertain if there are limits to the capacity of a satellite system or if other systems can be positioned to support increased requirements. All of these conditions are no different than the thought process the CINC must accomplish when he develops a plan to use military transport to move men and equipment.

To effectively apply space forces the commander must identify the lowest level at which he wants space capability to reside and which type of forces will be required to have all capabilities. Finally, the operations plan must recognize the difference between forces with full space force enhancement capability and those forces with limited or no capability to use space information.

This is not to suggest that without space assets an air, ground or sea force cannot implement an operations plan. However, in Desert Storm, there was different access to space assets throughout the theater. Those forces with space assets were able to plan and operate at a higher, more efficient level when executing the campaign plan. Proper planning related to the use of space assets will allow more forces and the right forces to operate with greater precision and efficiency to accomplish the military objective and strategic goal.

## VI. Conclusion

Space is not only a future battle ground which should be studied and analyzed but a current force multiplier with significant impacts on terrestrial conflicts. Recent studies on space warfare have largely ignored the current capabilities and focused developing doctrine, operational art concepts, and principles of war which apply to war in space. Although this area of warfare requires analysis for planning, structuring, and conducting future military space forces it is vital to address the

current capability of space to support air, land, and sea forces.

The lack of focus on this area left the commanders in Desert Storm without a framework for integrating space into terrestrial warfare. As a result many space force capabilities were not initially integrated into the war plan but were added as the multiplying effects of space became apparent. This did not allow for optimum use of space forces due to the ad hoc plans and procedures used to integrate space into warfare. With the concepts of operational art applied to space forces in the manner described in chapter V, the CINCs will have a framework for understanding how space can be integrated with terrestrial forces to enhance the planning, execution, and sustainment of the operational level of war. Space will allow the commander greater control of his forces and change the paradigms of time and space related to warfare.

The first commander able to "space" equip all his forces and integrate the use of space into the operational campaign plan will significantly change the tempo and conduct of war forever. To equip forces for space, it is vital for commanders develop a framework to understand their space assets. With an understanding of space forces, commanders can integrate current space capabilities into operational plans and enhance their ability to respond during future land, sea, and air conflicts.

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